

sPHENIX Paper updates

October 4, 2016

Initial Feedback

Paper committee is taking feedback!

-please send by **October 10th**.

Organizing feedback on the wiki:

https://wiki.bnl.gov/sPHENIX/index.php/T-1044_publication_comments

T-1044 publication comments

Comments received on draft version

static copy of draft

» Draft: (Version from 9/26/2016) [File:Beam-test-results.pdf](#)

Jamie Nagle

Received 10/2/2016

1. abs - "design ... were" -> awkward, designs were
 - » Notes: Basic grammar, based on comment from John L. It may require a rewrite
 - » Section editor: Megan
 - » Assigned responder: Ron
 - » Official response:
2. abs - "to measure jets" -> this is quite restrictive even as the sPHENIX program might be broadening... perhaps something like measure jets, heavy quarkonia, and associated observables..."
 - » Notes:
 - » Section editor: Megan
 - » Assigned responder: Ron
 - » Official response:

John LaJole

Received 10/3/2016

Abstract:

1. abstract - The electromagnetic and hadronic calorimeter design...
 - » Notes:
 - » Section editor: Megan
 - » Assigned responder: Ron
 - » Official response:

Comments uploaded

Initial Feedback

Anne comments:

- reference needed for Oleg's Pb glass results
- reordering of the text with respect to the light guide studies.
- Replace Figure 1 EMCAL pictures with 1D schematic drawing



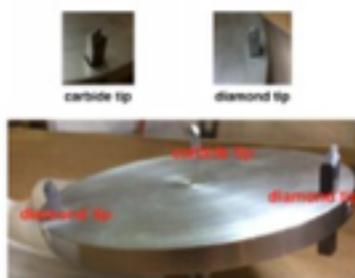
(a)

Scintillating fibers held by metal meshes



(b)

Tungsten powder and epoxy added



(c)

Finished modules are diamond cut



(d)

Final EMCal block

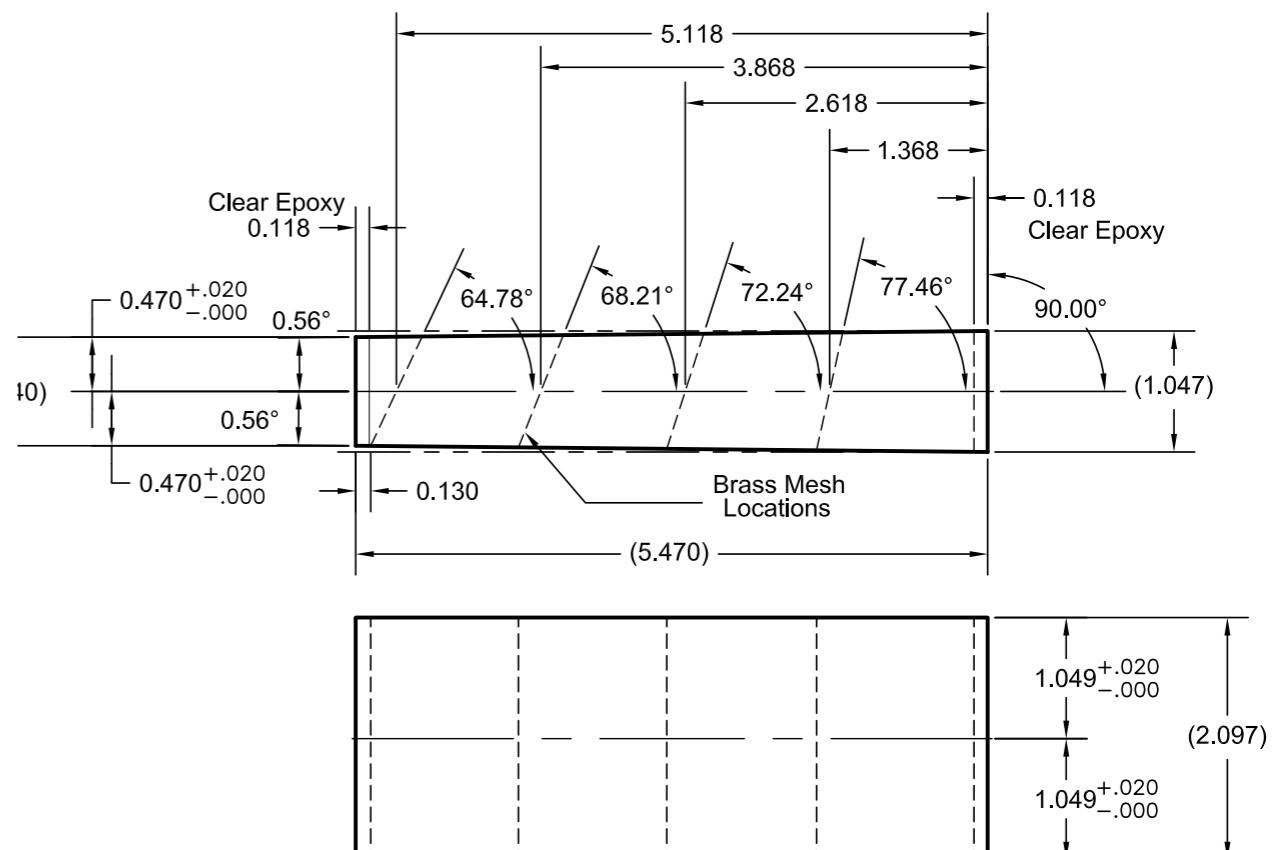


Figure 1: EMCAL module production. a) The scintillating fibers are placed in an aluminum mold with a 3D printed bottom, held by metal meshes to keep the fibers in place. b) After Tungsten powder is added, epoxy is poured uniformly over the mold where it dries for 24 hours. c) The modules are machined with carbide and diamond tips. d) The final module. e) The stack of completed modules along with the light guides in the second row. f) The first assembly of the module including light guides and SiPMs.

old figure 1

new figure 1

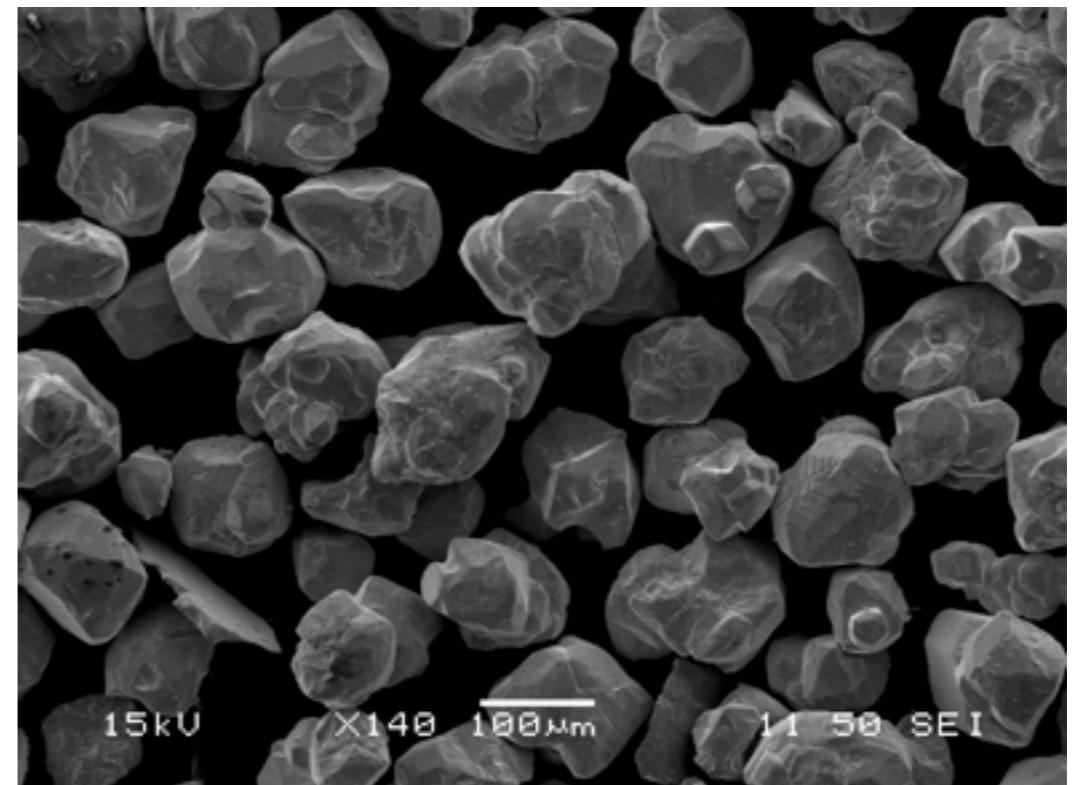
Initial Feedback

Anne comments:

Parameter	Units	Value
Inner radius (envelope)	mm	900
Outer radius (envelope)	mm	1161
Length (envelope)	mm	$2 \times 1495 = 2990$
tower length (absorber)	mm	144
Number of towers in azimuth ($\Delta\phi$)		256
Number of towers in pseudorapidity ($\Delta\eta$)		$2 \times 48 = 96$
Number of electronic channels (towers)		$256 \times 96 = 24576$
Number of SiPMs per tower		4
Number of towers per module		$2 \times 8 = 16$
Number of modules per sector		24
Number of towers per sector		384
Number of sectors		$2 \times 32 = 64$
Sector weight (estimated)	kg	326
Total weight (estimated)	kg	20890
Average sampling fraction		2.3%

Table 1: Key parameters of the EMCal

remove Table 1:
talks about the full sPHENIX EMCal



Add SEM Picture of Tungsten powder

Figure 27: comments

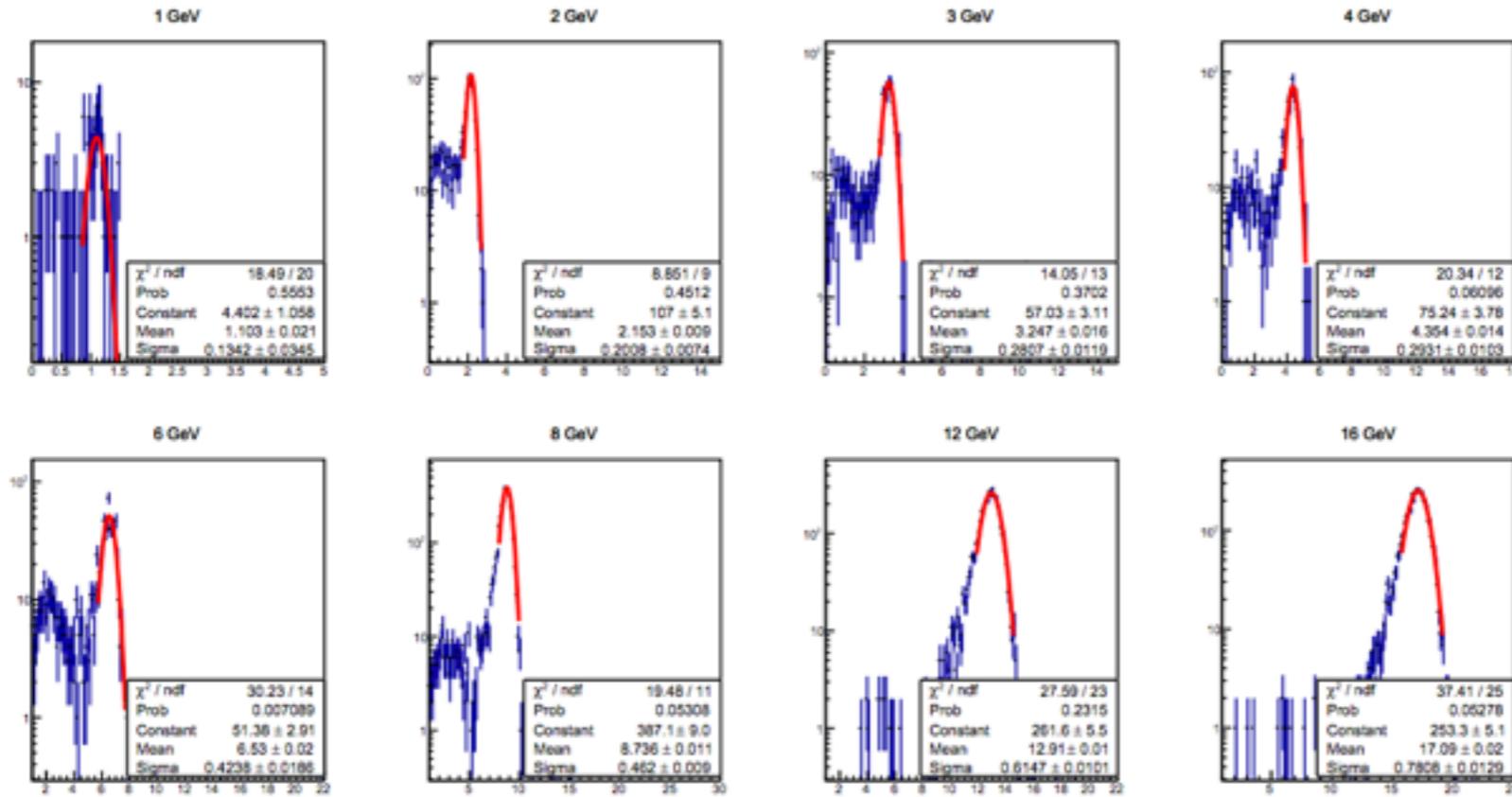
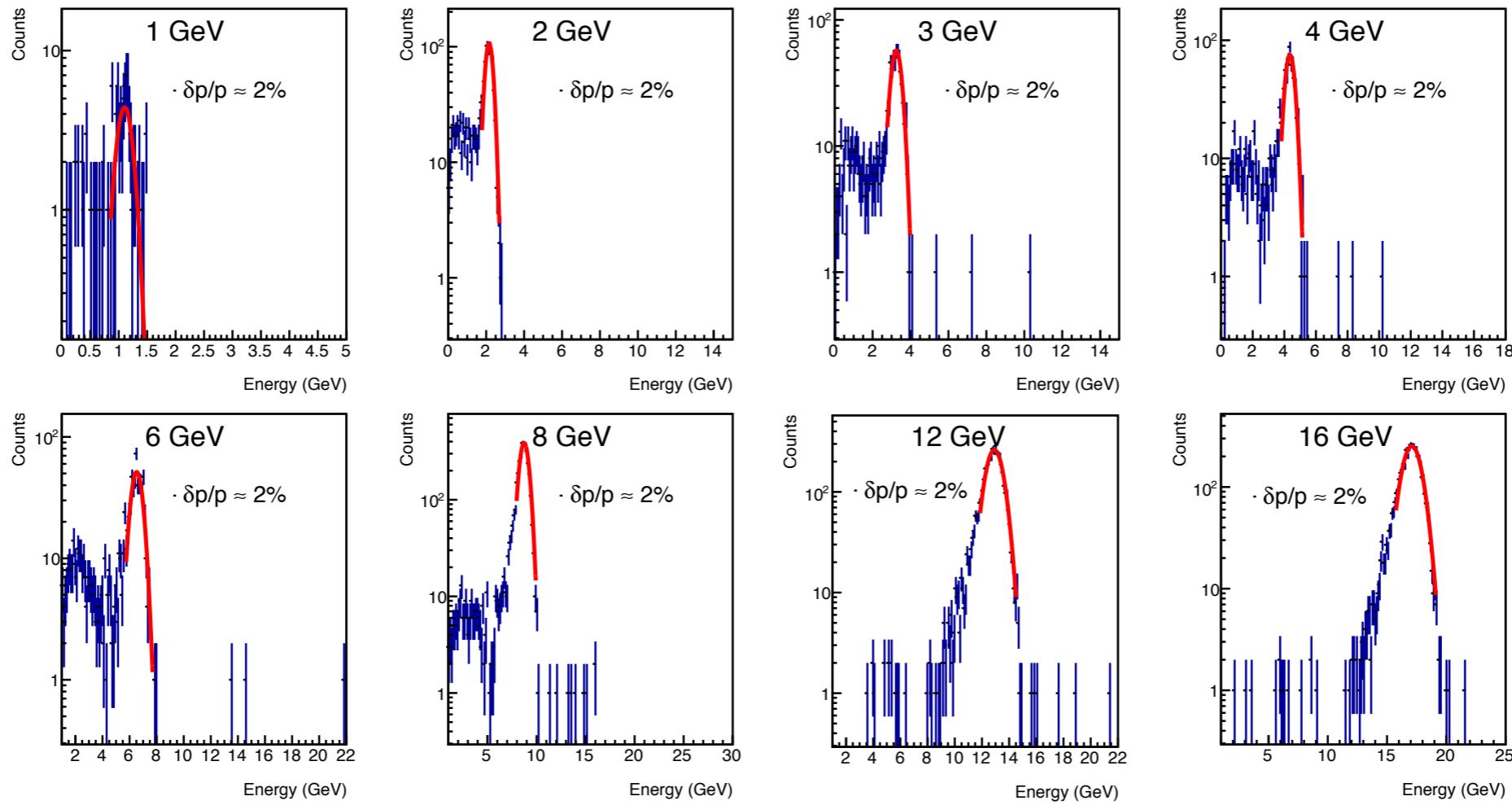


Figure 27: Cluster energy distribution of electron showers in EMCAL (blue points), for which the beam incident angle is 10 degrees and a $5 \times 5 \text{ mm}^2$ beam cross section is selected at the center of one EMCAL tower. The central tower and most near-by tower are produced at UIUC. For each panel, data for one choice of beam energy is selected as shown in the title and the energy resolution prior to unfolding a beam momentum spread ($\Delta p/p \approx 2\%$) is extracted with a Gauss fit at the electron peak (red curve). Low energy tails stems from multi-particle background is excluded from the fit.

remove the stat boxes and put mean and sigma in a table,
added x and y labels
add the beam momentum spread

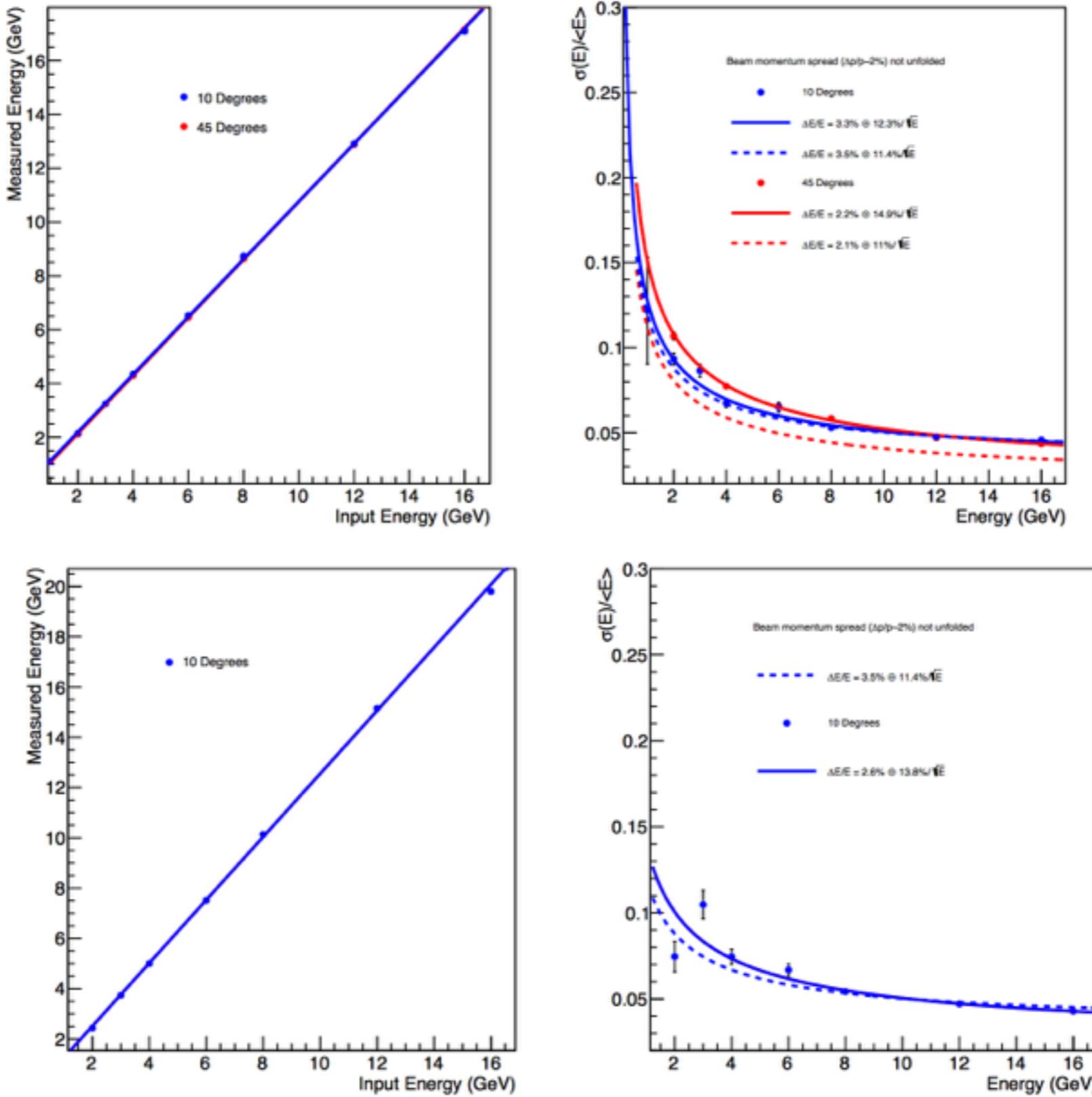
Figure 27: updates



Energy (GeV)	Mean (GeV)	Sigma (GeV)
1	1.103 ± 0.021	0.1342 ± 0.0345
2	2.153 ± 0.009	0.2008 ± 0.0074
3	3.247 ± 0.016	0.2807 ± 0.0119
4	4.354 ± 0.014	0.2931 ± 0.0103
6	6.53 ± 0.02	0.4238 ± 0.0186
8	8.736 ± 0.011	0.462 ± 0.009
12	12.91 ± 0.01	0.6147 ± 0.0101
16	17.09 ± 0.02	0.7808 ± 0.0129

Table 7: Mean and sigma of the cluster energy distribution of electron showers in EMCal, for incident beam angle of 10 degrees and a $5 \times 5 \text{ mm}^2$ beam cross section

Combine Figure 28 & 29



add indication
for data vs. simulation

Figure 28/29: Linearity and resolution of electron showers in EMCal towers produced by UIUC/THP, for which a $10 \times 5 \text{ mm}^2$ beam cross section is selected at the center of one EMCal tower.

Combine Figure 28 & 29

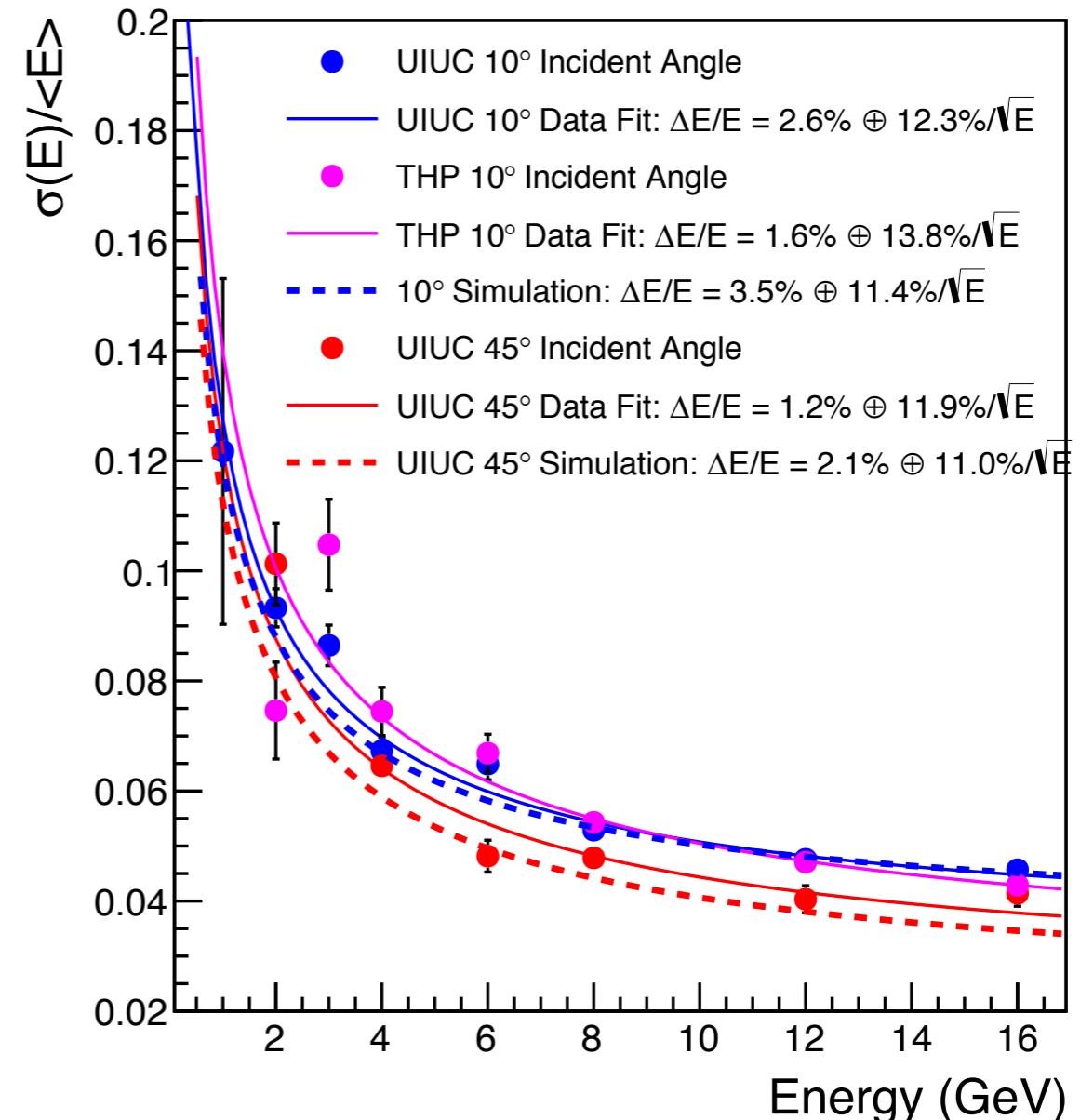
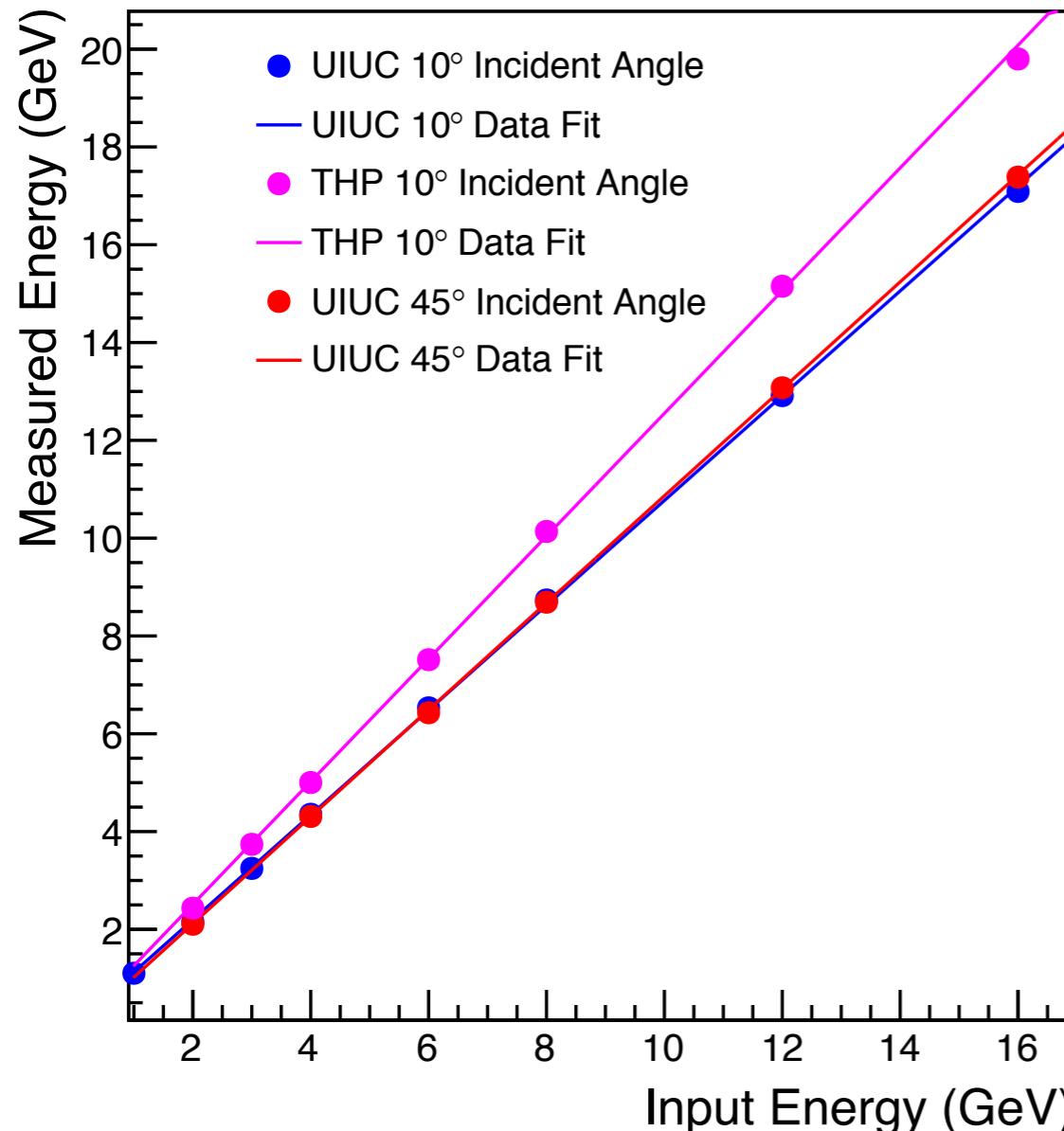


Figure x: Linearity and resolution of electron showers in EMCal towers produced at UIUC & THP, for which a $10 \times 5 \text{ mm}^2$ beam cross section is selected at the center of one EMCal tower.

Note: 2% beam momentum added now to the fits

res = sqrt(0.02*0.02 + const*const + (A / sqrt(E))*(A/sqrt(E)))

Figure 27: comments

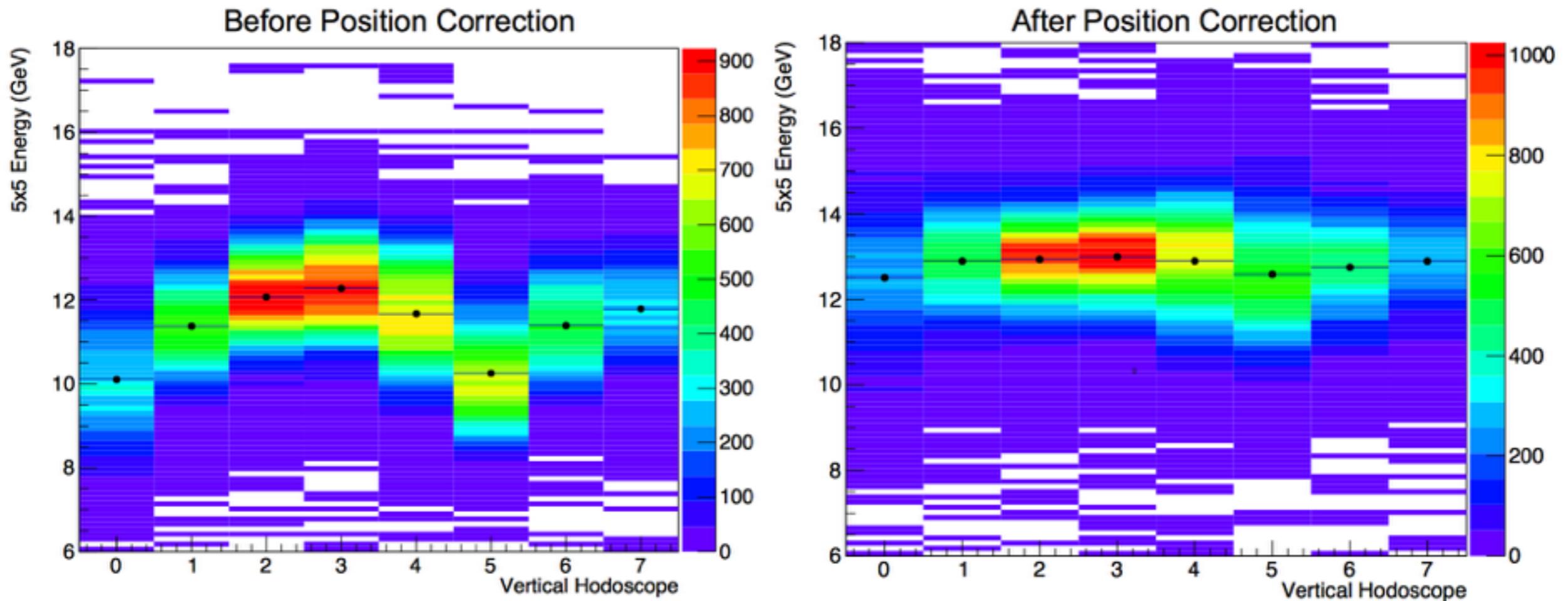
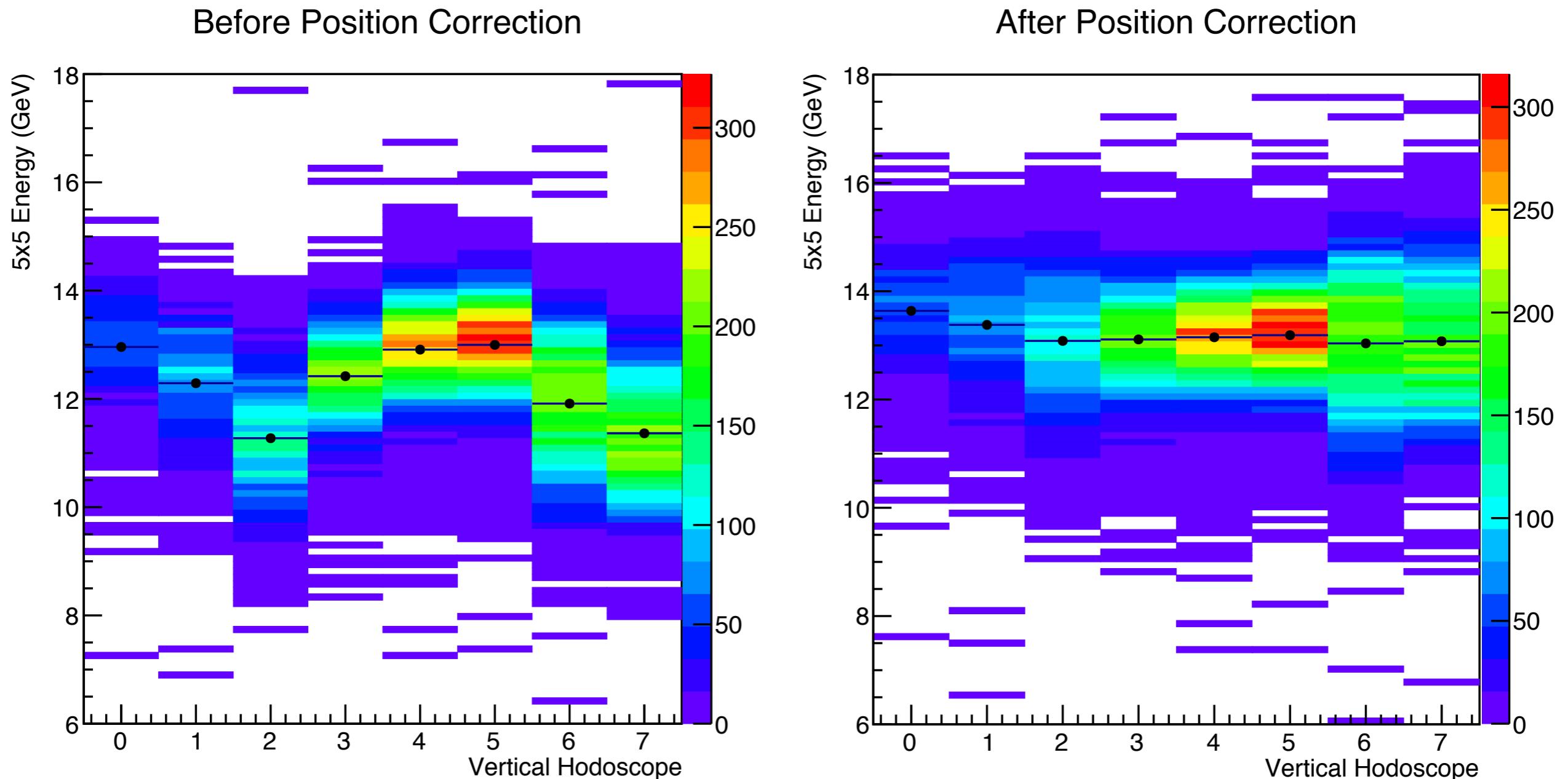


Figure 30: Cluster energy vs. vertical hodoscope in the EMCAL towers produced at UIUC before and after the position correction for a $25 \times 25 \text{ mm}^2$ beam cross section is applied. The beam energy shown is at 12 GeV with an incident angle of 10 degrees. Data is shown prior to unfolding a beam momentum spread ($\Delta p/p \approx 2\%$).

change the beam energy to be 6 GeV instead of 12 GeV

Figure 27: update



now has the beam energy for 6 GeV

Combine Figure 31 & 32

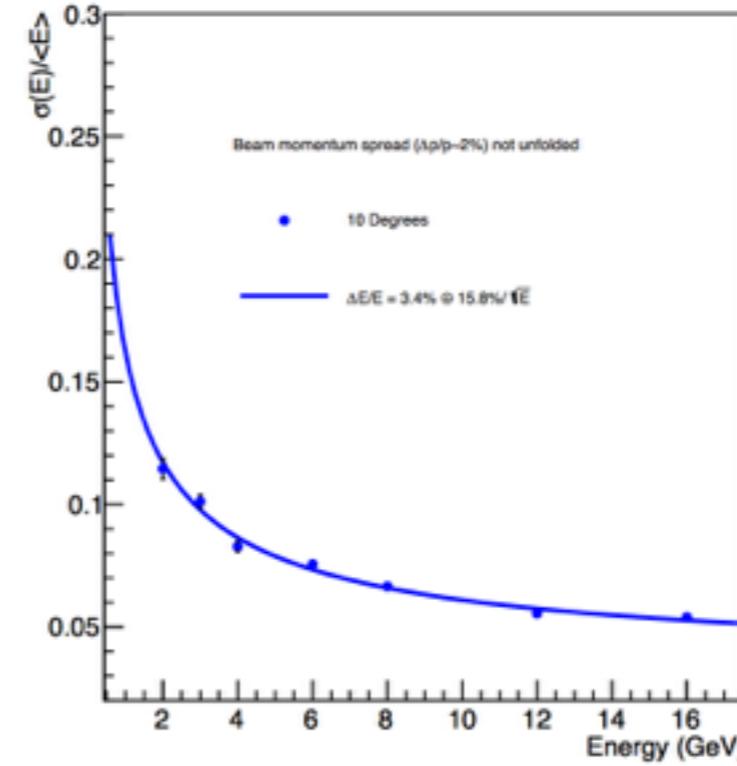
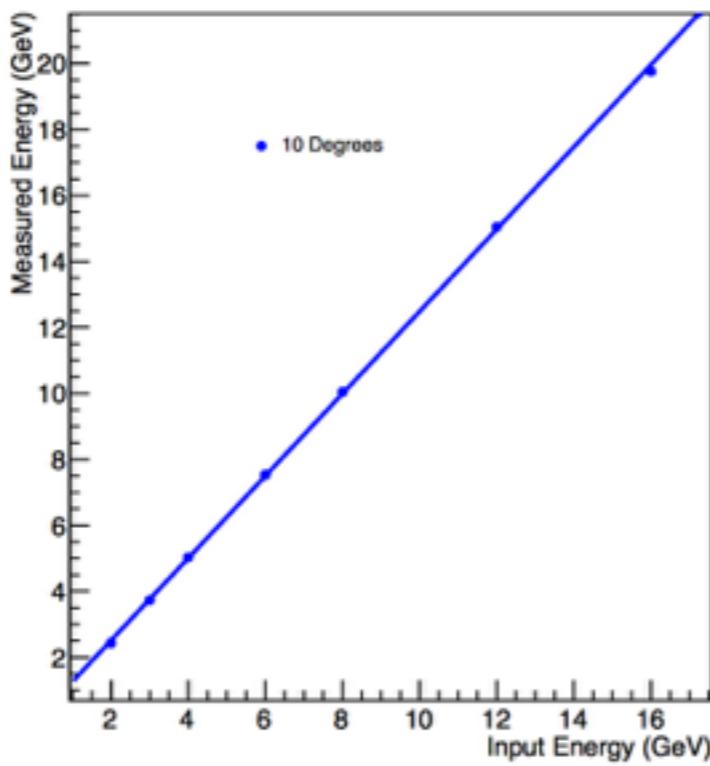
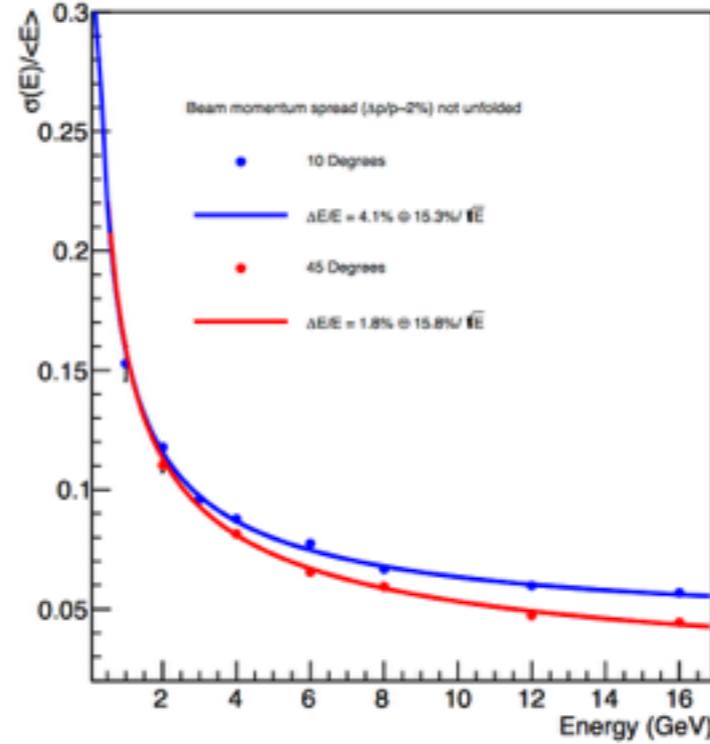
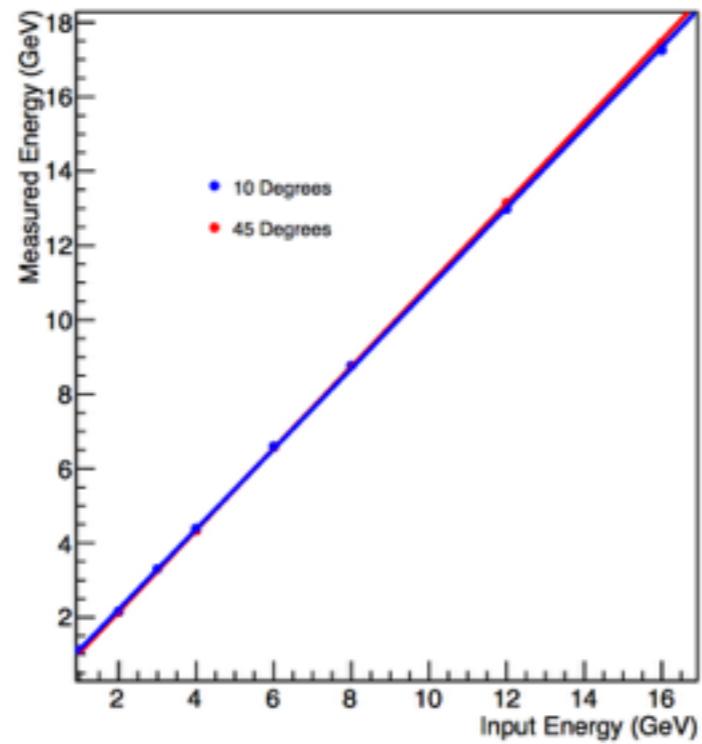


Figure 31/32: Linearity and resolution of electron showers in EMCal towers produced at UIUC/THP, for which a $25 \times 25 \text{ mm}^2$ beam cross section is selected and matches the area of one EMCal tower.

Combine Figure 31 & 32

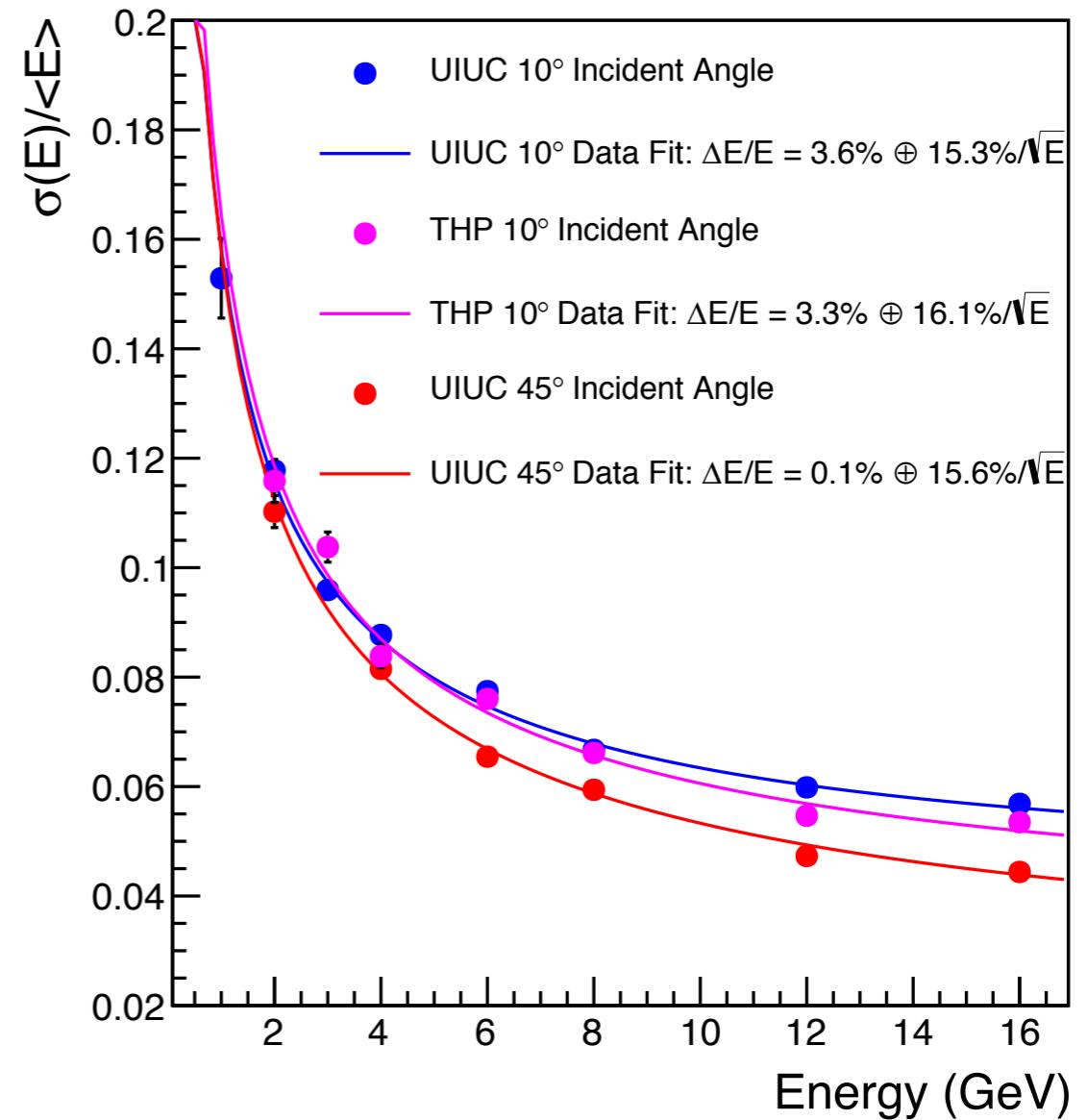
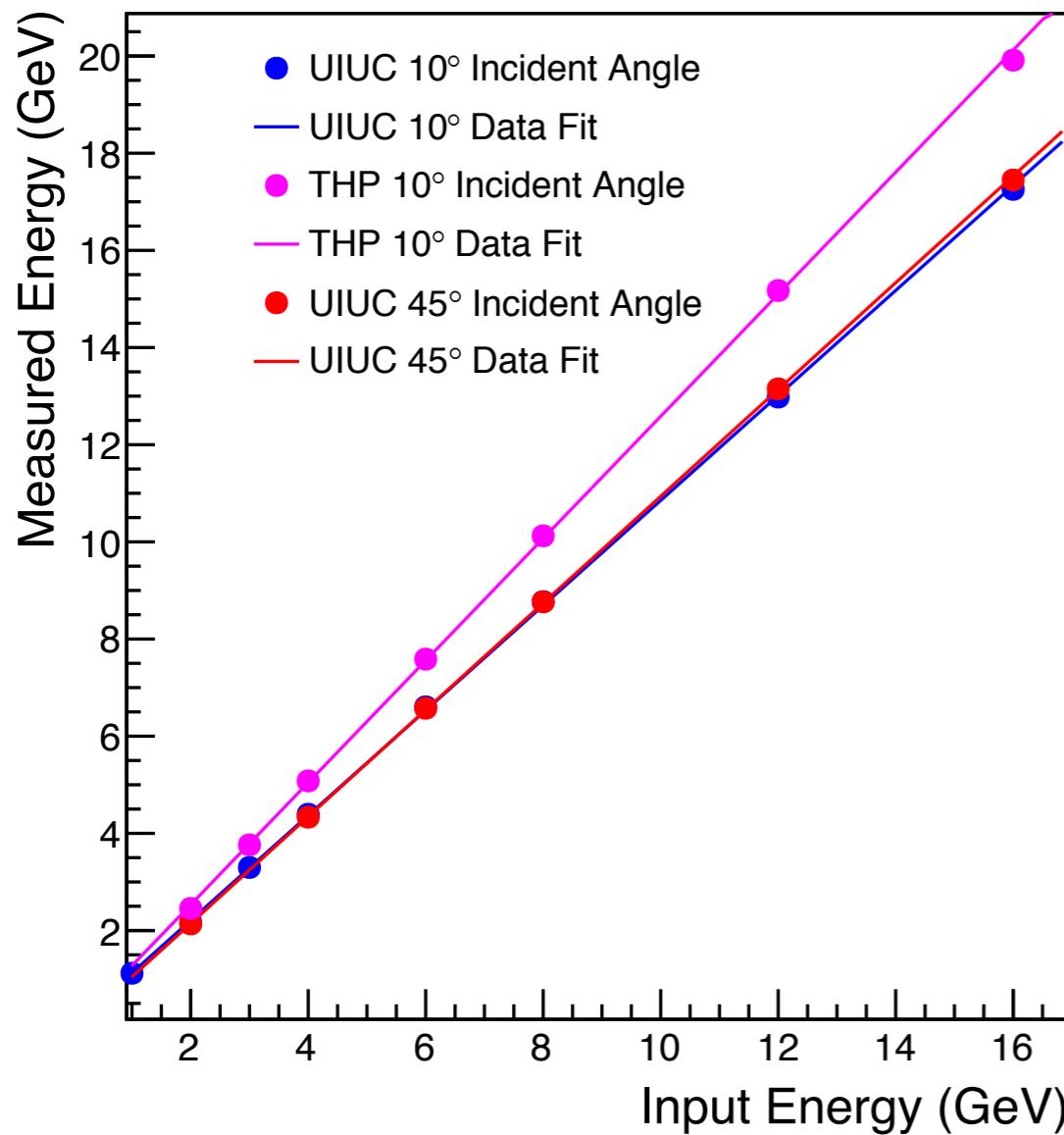


Figure x: Linearity and resolution of electron showers in EMCAL towers produced at UIUC & THP, for which a $10 \times 5 \text{ mm}^2$ beam cross section is selected at the center of one EMCAL tower.

Note: 2% beam momentum added now to the fits

res = sqrt(0.02*0.02 + const*const + (A / sqrt(E))*(A/sqrt(E)))

Back up slides

Keeping Figures Separate

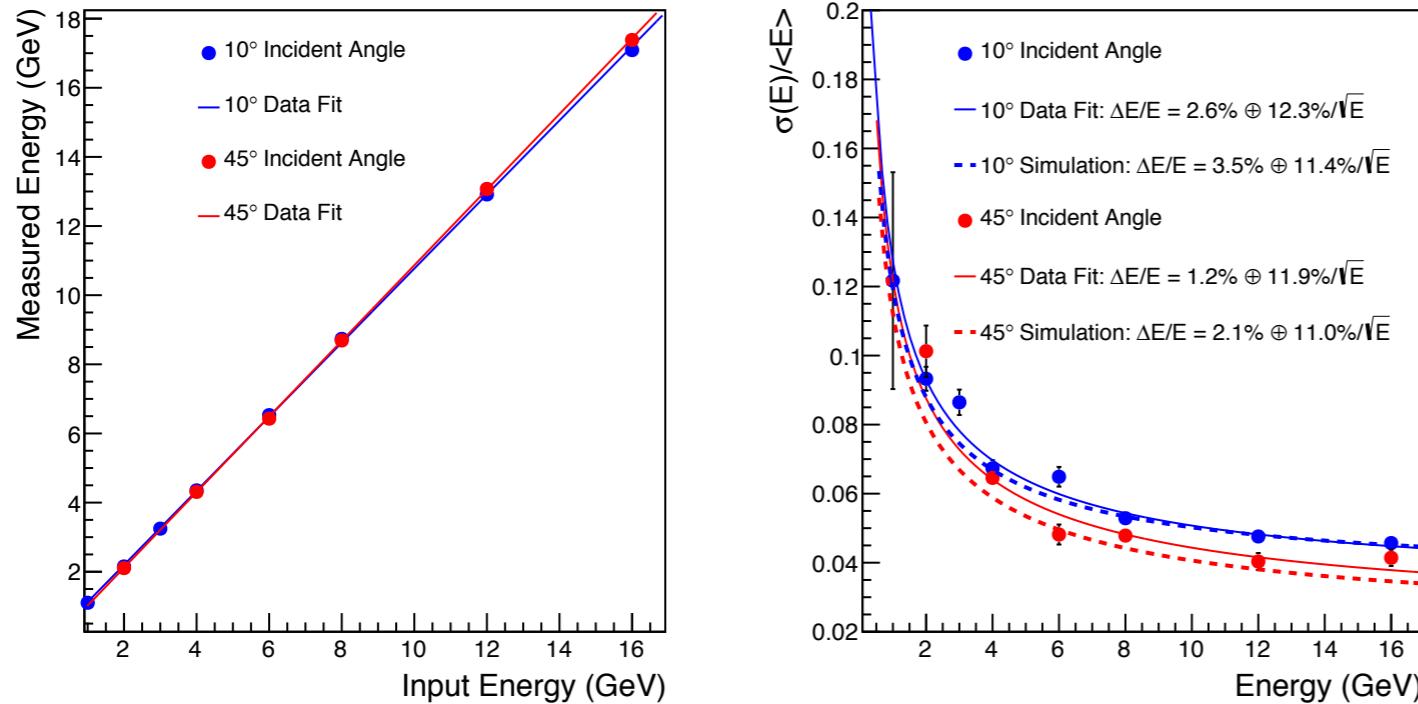


Figure 28

Note: 2% beam momentum added now to the fits
 $\text{res} = \sqrt{0.02*0.02 + \text{const}*\text{const} + (A / \sqrt{E})*(A/\sqrt{E}))}$

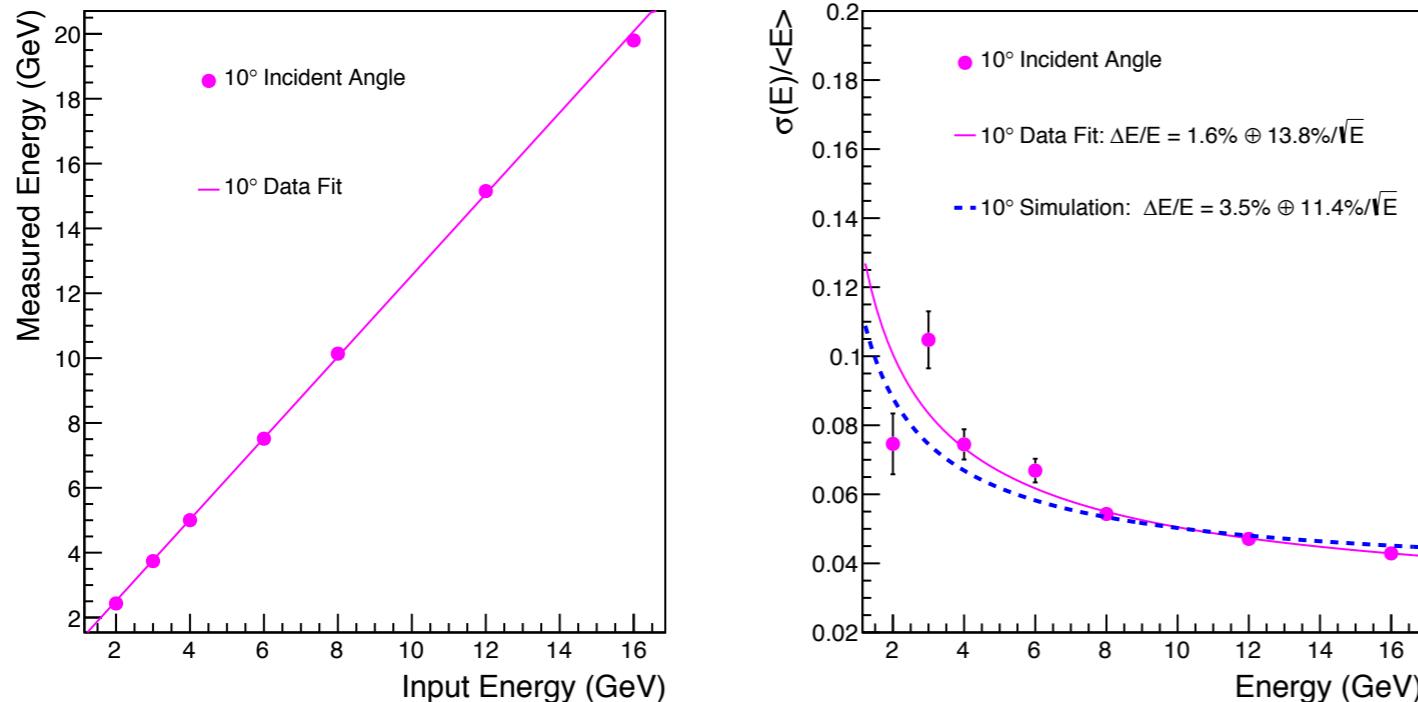


Figure 29

Note: 2% beam momentum added now to the fits
 $\text{res} = \sqrt{0.02*0.02 + \text{const}*\text{const} + (A / \sqrt{E})*(A/\sqrt{E}))}$

Keeping Figures Separate

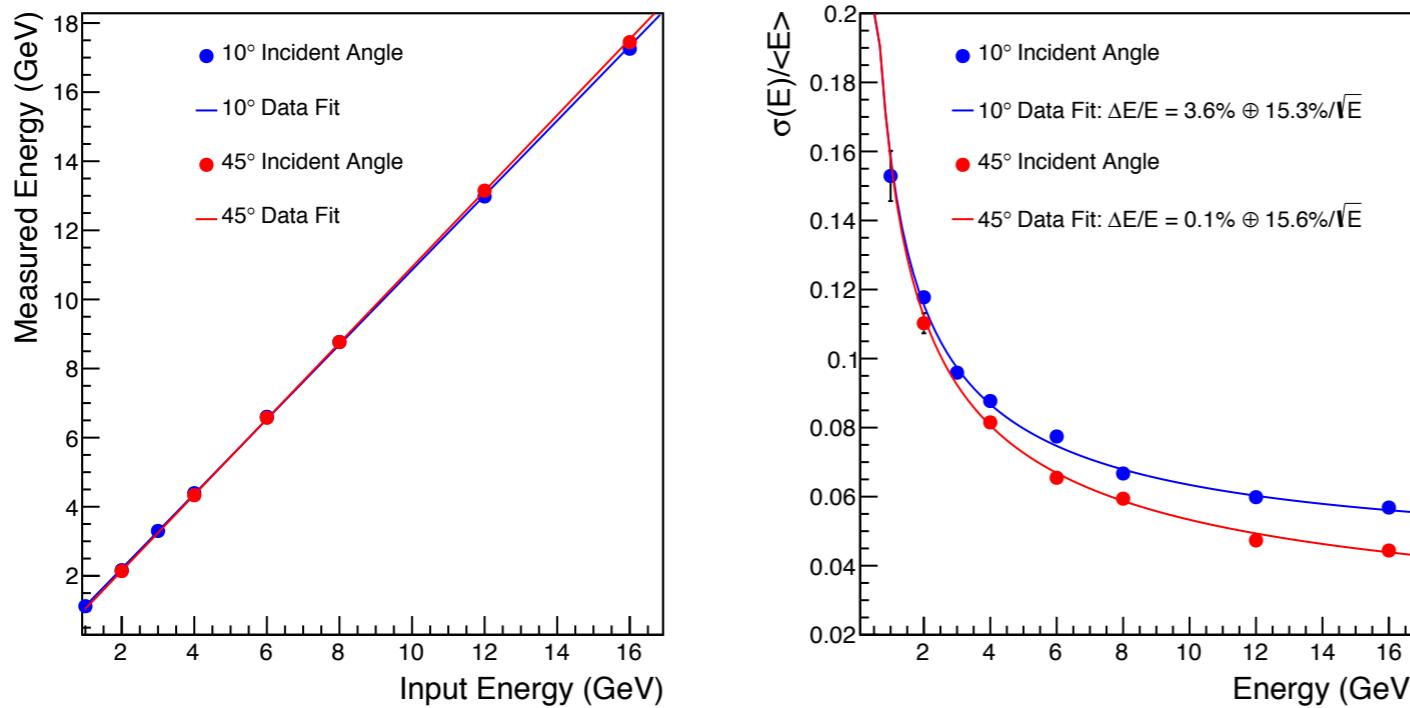


Figure 31

Note: 2% beam momentum added now to the fits

$$\text{res} = \sqrt{0.02*0.02 + \text{const}*\text{const} + (A / \sqrt{E}) * (A/\sqrt{E}))}$$

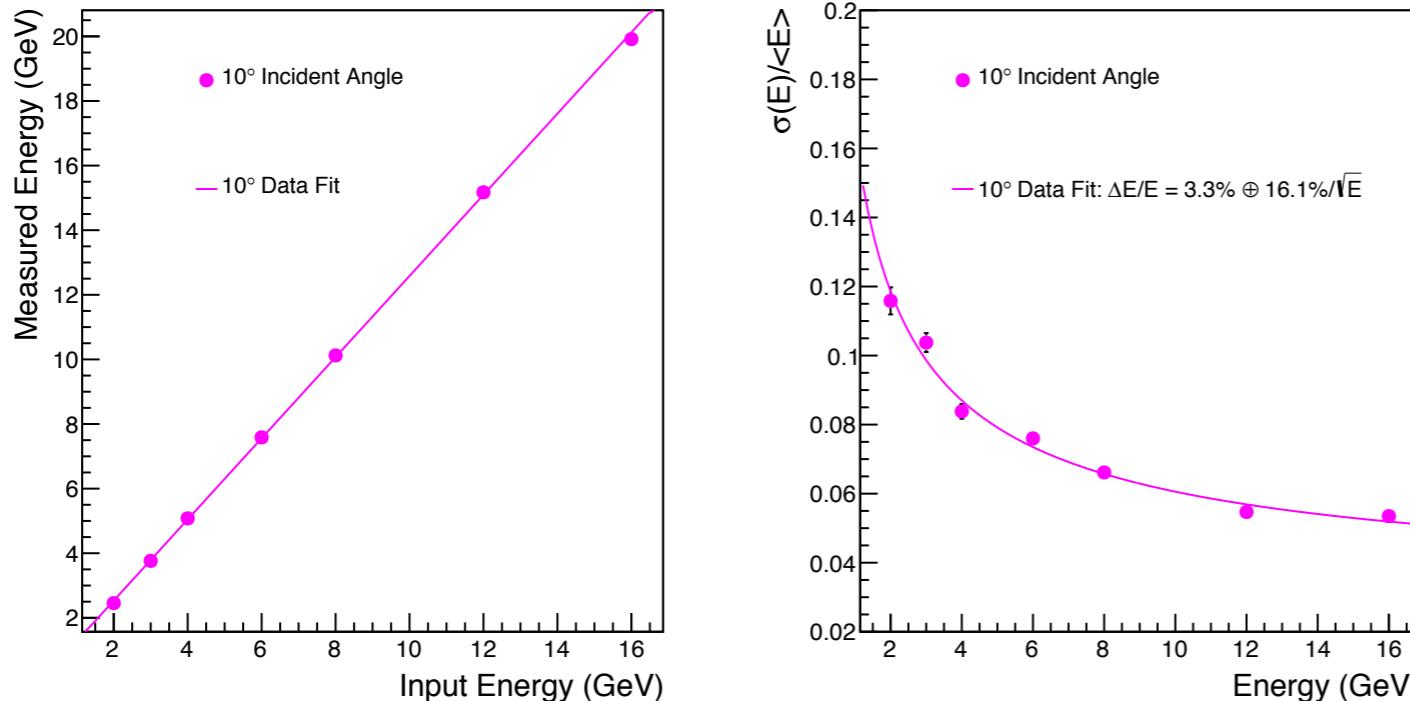


Figure 32

Note: 2% beam momentum added now to the fits

$$\text{res} = \sqrt{0.02*0.02 + \text{const}*\text{const} + (A / \sqrt{E}) * (A/\sqrt{E}))}$$